

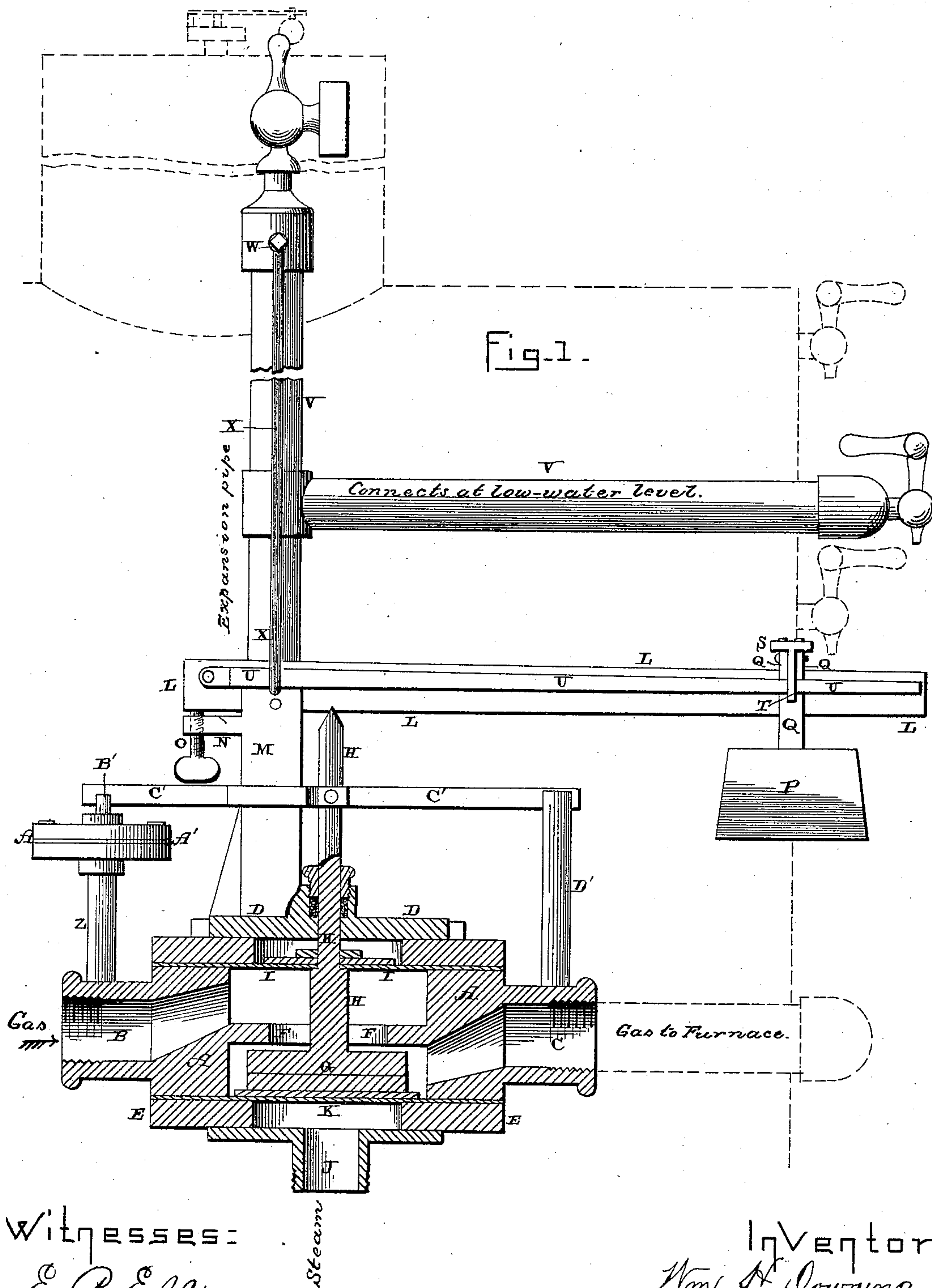
(No Model.)

2 Sheets—Sheet 1.

W. H. DOWNING.
GAS GOVERNOR OR REGULATOR.

No. 407,645.

Patented July 23, 1889.



Witnesses:

E. P. Ellis,
Allen S. Patterson

Inventor:

Wm. H. Downing,
per J. A. Lehmann,
Atty

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

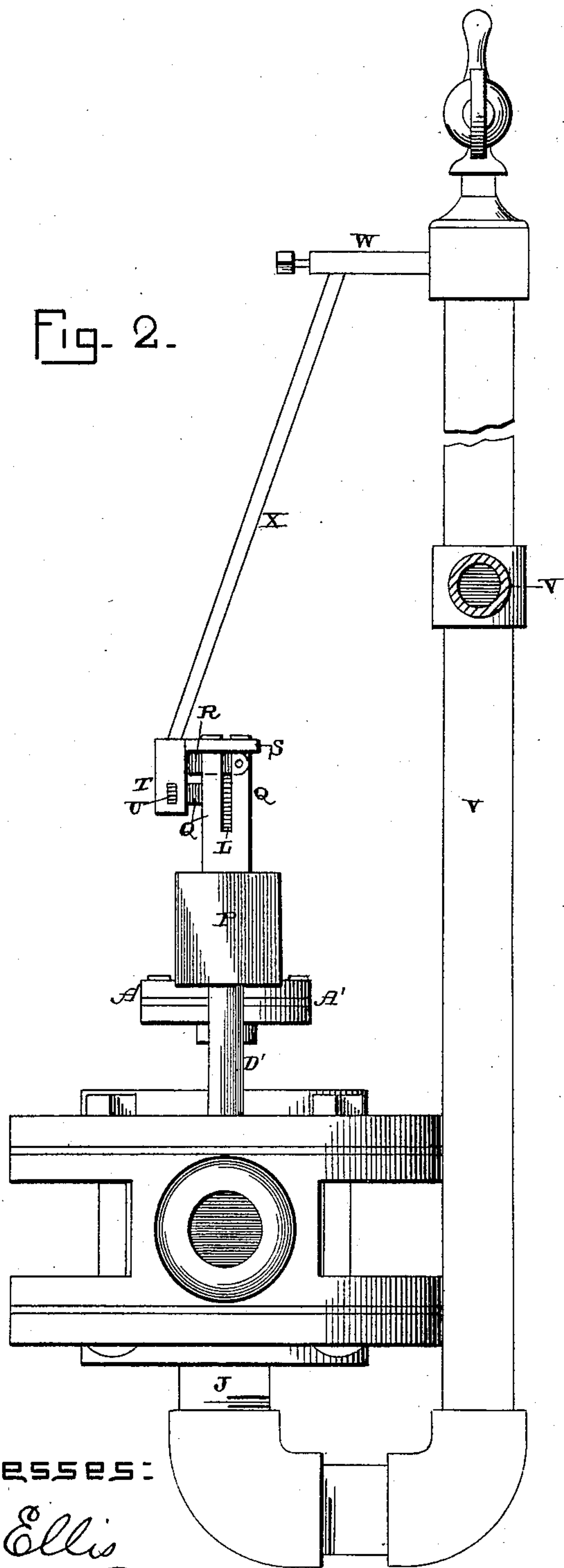


Fig. 3.

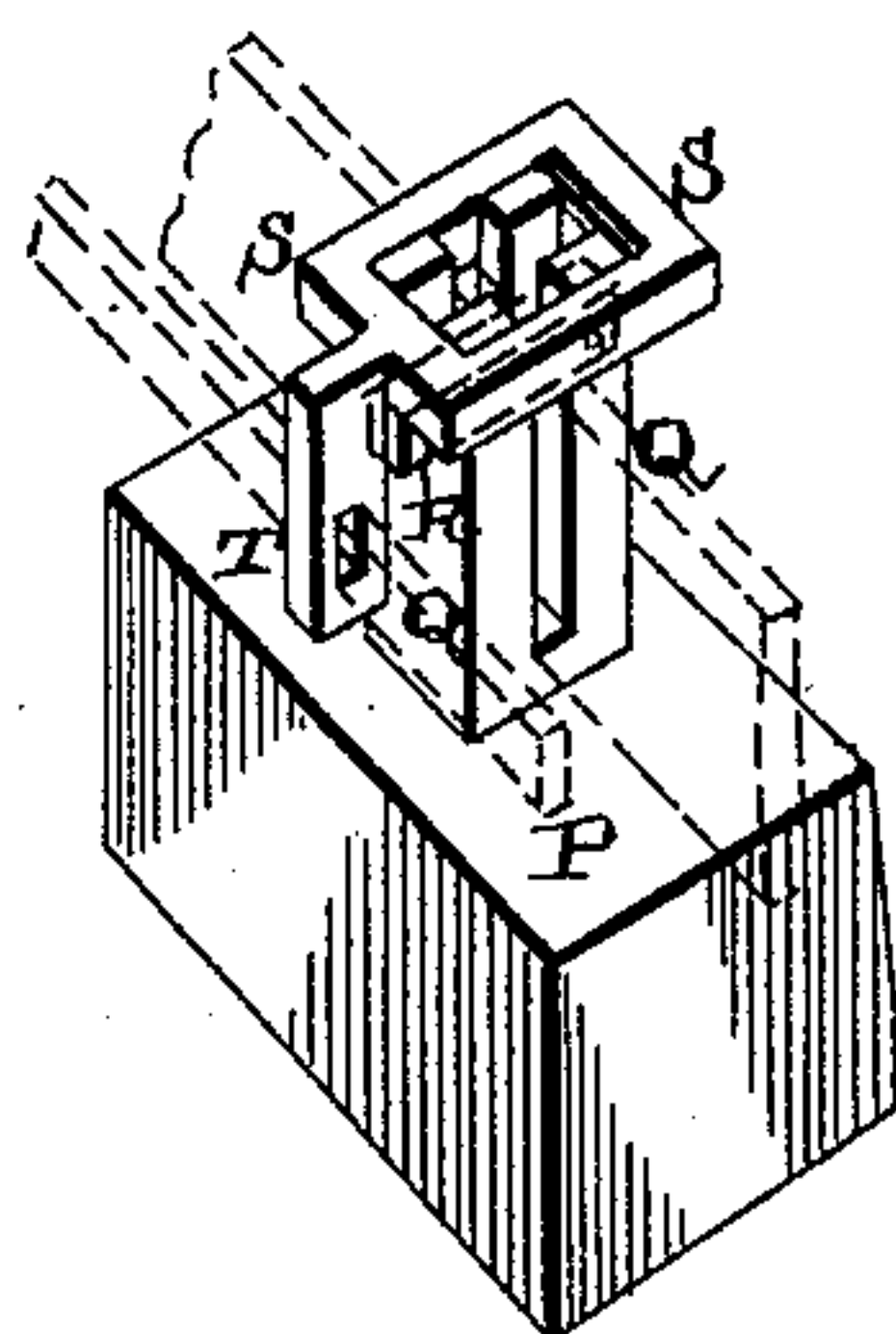
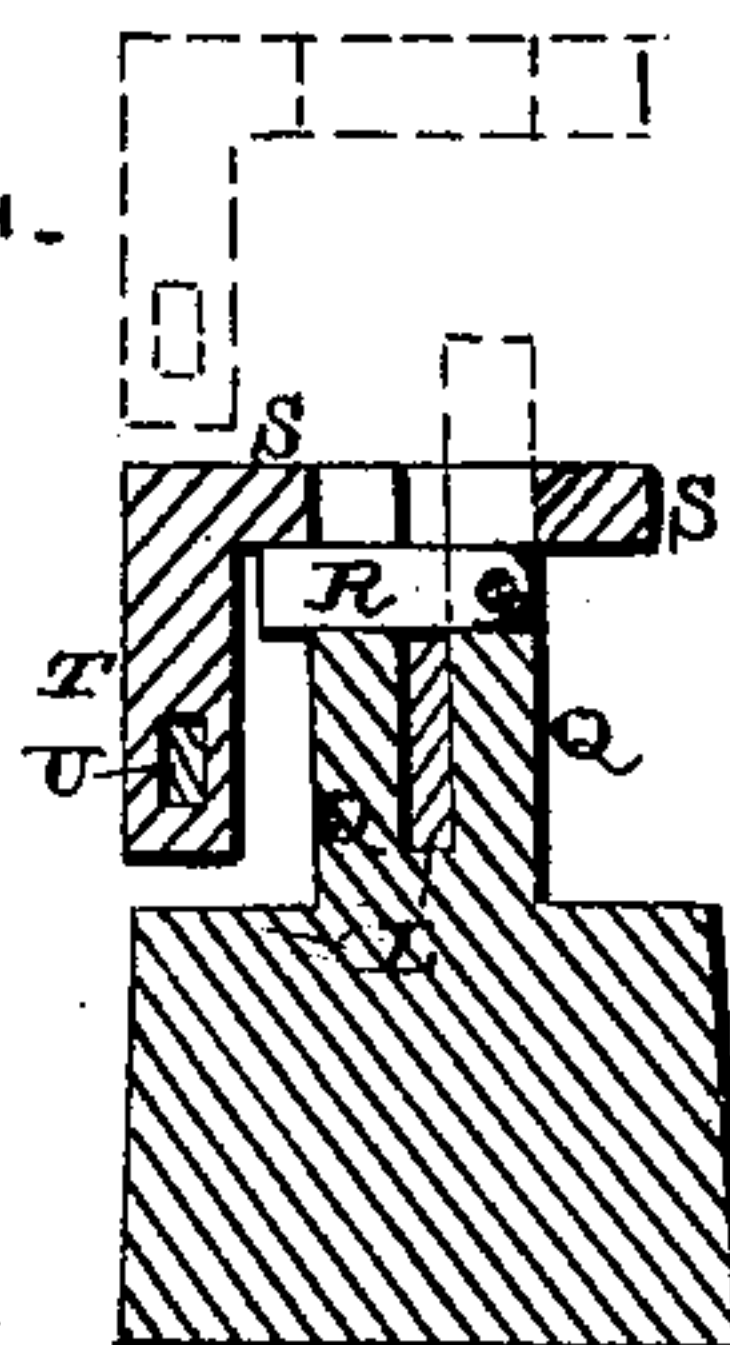


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM H. DOWNING, OF GOODELL, PENNSYLVANIA.

GAS GOVERNOR OR REGULATOR.

SPECIFICATION forming part of Letters Patent No. 407,645, dated July 23, 1889.

Application filed March 15, 1889. Serial No. 303,424. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DOWNING, of Goodell, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Gas Governors or Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in gas governors or regulators; and the object of my invention is to produce a regulator by means of which the amount of gas fed to the furnace is regulated in exact proportion to the amount of steam needed, and by means of which, when the water in the boiler falls to a certain level, the supply of gas is instantly cut off.

Figure 1 is a vertical section of a regulator which embodies my invention. Fig. 2 is a side elevation of the same, taken at right angles to Fig. 1. Fig. 3 is a perspective of the weight and its attachment. Fig. 4 is a detail view of the weight and its attachments.

A represents the body of the regulator, which is provided with an inlet-opening B for the gas and an outlet-opening C, which communicates with the fire-box of the boiler. In this body is formed the valve-seat and opening F, through which the passage of gas is controlled by the valve G, which is secured to the stem H, which passes up through the top plate D, as shown. Through the top plate D is made a suitable opening, and between the body A and the plate D is placed a diaphragm I, which is almost as large as the valve G, so as to form a balance-valve, or nearly so, as the pressure of the gas passing through the regulator is the same upon it. This diaphragm is secured to the stem H, so that any upward and outward movement of the diaphragm counteracts the pressure of the gas upon the valve G. The bottom plate E of the body A also has an opening made through it, and into this opening through the pipe J is introduced water or steam from the boiler, and which is made to exert a pressure against the diaphragm K to act in connection with the valve G, the stem H, and the

weighted lever to regulate the supply of gas to the fire-box of the boiler to keep the steam at any desired pressure. The valve-stem H, the valve G, and the plate formed on the bottom of the valve and resting on the diaphragm K are made in one piece.

The valve-stem H, which projects through the top plate D, has its upper end to bear against the lever L, which is pivoted upon the extension M, formed on the top of the plate D. Projecting from this extension M is an arm N, through which a set-screw O passes, so as to bear against the lower edge of the shorter end of the lever L, for the purpose of preventing the valve G lifting or closing enough to entirely put out the fire. Upon the lever L is hung the weight P, from which rise the two standards Q, which are separated just sufficiently to allow the lever L to pass between them, and which are provided with the pivoted latch R, which catches over the top of the lever L. This latch R is kept closed by the movable cap S, which is placed upon the top of the projections Q, and which keeps the latch R pressed down upon the top of the lever L. This cap has formed upon one edge a slotted extension T, through which passes one end of a rod or lever U, which is pivoted at its inner end to the lever L, and which has an independent movement of the lever L.

Connected to the boiler at the lowest point to which the water can safely drop is the pipe V, which may be provided with a stop-cock at its outer end, and in which the water stands when the water rises in the boiler above its lower end. This pipe stands full of water until the water drops below its lower end, when the water runs out of the pipe and steam instantly takes its place for the purpose of expanding the pipe V lengthwise. Projecting out from the upper end of the pipe V is an arm W, and passing through this arm W and secured thereto by a set-screw is the rod X, which has its lower end fastened to the rod U in a line with the pivot upon which the lever L turns, so that the movement of the lever L up and down does not affect the connection of the rod V with the rod or lever U. The expansion of the pipe V causes the rod X to exert a slight upward pressure upon the rod U, and the movement of the rod U lifts the cap S from

the projections Q upon the weight P, and the movement of the cap S leaves the latch free to open, when the weight P instantly drops. The weight being removed from the lever L, the pressure of the gas against the diaphragm I and the pressure of the steam or water against the diaphragm K instantly cause the valve G to close, when the gas is shut off from the furnace, and remains shut off until relighted by the engineer.

Connected to the body A is a pipe Z, and to the top of this pipe is connected a diaphragm A', and connected to the stem B' of the diaphragm is a lever C', which is pivoted to the stem H. The other end of the lever C' is supported by a standard D'. When the pressure of the gas exceeds a certain regulated amount, the diaphragm A' causes the lever C' to lift the stem H and partially close the valve G, so as to regulate the amount of gas which is fed to the furnace.

In operating oil-wells the pressure of the gas is variable. When shut off at night, the gas accumulates, and as it is used in the daytime the pressure of the gas decreases. The gas being much stronger in the morning, a greater amount of gas is liable to be fed to the furnace at this time than later in the day, when the pressure of the gas becomes weaker. The pipe Z, the diaphragm A', and the lever C' serve to regulate the pressure of the gas, so that a uniform amount will be fed to the boiler at all times.

The operation of my invention is as follows: When the gas is turned on, it passes into the regulator A through the opening F, past the valve G, and into the fire-box of the boiler. The weight P upon the lever L, which bears down upon the stem H, causes the valve G to open, and as the pressure of steam rises in the boiler it forces upward upon the diaphragm K, so as to gradually close the valve G sufficiently to hold the steam at a certain pressure. The pressure of the water upon the lever L being regulated, if a certain amount of steam is being used it holds the steam at one point, and any variation in the pressure of the steam operates the valve either for the purpose of opening or closing it. When the pressure of the gas is variable, the diaphragm acts upon the lever G' and the stem H, so as to open or close the valve G in direct proportion to the pressure of the gas. If the water in the boiler drops below the point where the

expansion-pipe V is connected to the boiler, the water in the pipe runs back into the boiler and steam takes its place, expanding the pipe V, which by means of the rod X lifts the rod U, and by removing the cap S allows the weight P to drop from the arm, and when the weight drops the valve G is instantly closed by the pressure from the boiler so as to shut off the gas entirely until relighted by the engineer.

Having thus described my invention, I claim—

1. The combination of the regulator A, the valve G, the stem H, the weighted lever L, which bears upon the stem for regulating the flow of gas, and the diaphragm I, connected to the stem, the diaphragm K, and the pipe J, connected to a boiler or water-supply for shutting off the flow of gas when the limit of the steam-pressure is reached, substantially as set forth.

2. The combination of the pivoted lever L, the weight P, placed upon it and provided with a latch, a removable cap S, provided with a slotted guide R, a rod or lever U, pivoted to the lever S, the expansion-pipe, and a rod connected to the pipe and to the rod U, substantially as specified.

3. The combination of the regulator, a valve placed therein, a weighted lever for bearing upon the stem of the valve, and an expansion-pipe, a rod connected to the pipe, a rod or lever pivoted to the weighted lever, and the weight adapted to drop from its lever and which is operated by the rod U, substantially as shown.

4. In a gas-regulator, the combination of a valve, a weighted lever, expansion-pipe which is connected to the boiler, a rod connected to the expansion-pipe, a lever which is operated by the rod connected to the expansion-pipe, a detachable weight which is connected both to the lever and the rod which is pivoted thereto, and a diaphragm which is placed in the regulator for closing the valve when the weight is detached from the levers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. DOWNING.

Witnesses:

GEORGE J. WOLF,
JAMES GEORGE.